

EXSECTION OF THE KNEE-JOINT FOR
TUBERCULOSIS.¹

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WHITE swelling of the knee-joint in adults of the laboring class can, for various external reasons, rarely be treated by orthopædic measures. In children a rational mechanical and general treatment will often reward the patience and skill of the physician by excellent results. Exsection of the knee-joint in infants is to be avoided as long as possible, on account of the great shortening that is caused by the removal of the epiphysis adjoining the knee, on which depends the growth of the thigh and tibia. In adults exsection is the shortest and safest way of eliminating tedious morbid processes and substituting firm ankylosis for a useless joint.

Arthrectomy, or exsection of the capsular ligament alone, as suggested by Volkmann, has not been attended with good success in the experience of the writer. Two cases, one in an adult, the other in a child, resulted in relapse of the tubercular affection, although great care was taken in removing the entire capsule. A third case was permanently cured. The following are brief synopses of these cases:

CASE I.—S. L., metal worker, æt. 27 years. On February 28, 1882, arthrectomy was performed, the patella being removed for fungous arthritis of the knee-joint. Primary union occurred. On March 22 the disease occurred in the cicatrix, and gradually involved the articular surface of the femur and tibia. Amputation was performed by Dr. J. Adler.

CASE II.—Fred. O., æt. 5½ years. Tubercular arthritis of the knee-joint. On January 26, 1887, arthrectomy was performed at the German Hospital. On March 22 the entire cavity was opened and

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scraped because of recurrence of the disease. At the present date the boy is still under treatment.

CASE III.—George K., butcher, æt. 26 years. On July 6, 1882, arthrectomy was performed at the German Hospital; a carious patella being removed. On November 5 he was discharged cured, with slight mobility of the joint.

In children exsection should be made only under very urgent, especially vital indications, and should be strictly limited to the removal of diseased parts. By following Schedé's plan of dressing the wound, the hollow spaces remaining between the opposite joint-surfaces will be filled by an organizing blood clot, and firm union without suppuration may be obtained.

CASE IV.—Eva G., æt. 8 years. Osseous tuberculosis of the knee-joint, with a sequestrum in the external condyle; granular osteitis of internal condyle, and multiple cheesy deposits in the thickened capsule; subluxation backward of the tibia, with rectangular contraction. On August 12, 1886, partial exsection of the knee-joint was performed at Mt. Sinai Hospital. After the removal of the sequestrum a deep recess was left behind the inter-condylar notch. The patella and the entire capsule were removed; the hamstring tendons were divided to prevent recontraction. The tibia was pared superficially, and the bones were held in apposition by a nail driven diagonally through the femur and tibia. A plaster-of-Paris bandage was applied over Schedé's dressing. The patient had an attack of erysipelas. By reason of these complications healing was delayed.

On February 27, 1887, the patient was discharged cured, with firm ankylosis.

Total exsection of the knee-joint is usually performed by the writer in the following manner: After careful scrubbing and disinfection of the region of the knee, the foot, the leg, and the thigh of the diseased limb are enveloped in clean towels, wrung out in corrosive sublimate solution. The limb is elevated vertically for five minutes in order to deplete its vessels, and the constricting band is applied high up on the thigh. The knee is flexed, and an incision, commencing at the middle of the condyle of the femur and extending in a semicircular line *above* the patella to the middle of the other condyle, is carried into the joint. The transverse incision above the patella, proposed by Eugene Hahn, of Berlin, has many advantages over the incision made below the patella. The chief one is the free access which it affords to the bursa of the quadriceps, which must be carefully excised along with the capsule.

The crucial ligaments are divided close to their attachment to the femur and the patella, the semilunar cartilages, and the entire capsule, together with the bursa of the quadriceps, are excised with mouse-tooth forceps and curved scissors. Care must be taken not to overlook some small bursæ situated behind the head of the tibia, which regularly communicate with the interior of the joint. The condyles of the femur are sawed off, the plane of section corresponding to the transverse diameter of the epiphysis of the femur. Disregard of this rule will lead to ankylosis in such a position that the patient will be bow-legged. The articular surface of the tibia is sawn at a right angle to the long axis of this bone. All visible orifices of vessels are secured by ligatures; they can be recognized by compressing the vicinity of the wound with both hands.

If the transverse incision was not made long enough to permit of an easy arrangement of the drainage tubes in the angle of the wound, it should be sufficiently lengthened. The inner ends of the tubes should reach into the popliteal space, just behind the sawn surfaces, and the tubes must not be compressed and occluded by the tension of the soft parts surrounding them. The limb is placed upon a long cushion covered with a clean towel wrung out of corrosive sublimate solution, and, while the sawn surfaces are held in exact apposition, from two to four long steel nails, previously well disinfected by heating in an alcohol flame, are driven diagonally through the femur and tibia, so as to lock the bones firmly in the desired position. The cutaneous incision is united by a sufficient number of catgut sutures. The limb is raised by the foot from the cushion, which is then removed. Strips of disinfected rubber tissue are slipped under the safety pins securing the ends of the trimmed drainage tubes, and an oblong compress of iodoform gauze is laid over the entire line of union. A suitable number of sublimated gauze compresses are arranged around the knee-joint, and two short lateral splints of veneering, or thin board, are firmly bandaged on to serve as a deep support. Over these is placed an ample external dressing of corrosive sublimate gauze, also firmly secured by a gauze bandage. The towels are removed, and the uncovered parts of the limb are enveloped in a layer of borated cotton, so as to equalize its outline. Two long lateral pasteboard splints, secured by muslin or crinoline, complete the dressing for children or adolescents.

In adults, the limbs being stouter, are better secured by a firm circular plaster-of-Paris splint. The limb is elevated vertically, and the constricting rubber band is removed. The return of the circulation is

attested by the pink color of the toes. As soon as these turn pale, the extremity can be brought to the horizontal position.

If asepticism was well maintained the operation will be followed by slight aseptic fever, and no severe pain. The dressings should remain undisturbed for thirty days, so as to afford a good chance for bony union. After this period the splints and dressings can be removed, and the nails and drainage tube can be withdrawn. The remaining sinuses are dressed lightly, the limb is encased in a silicate of soda splint, and the patient is ordered to walk about on crutches, whether osseous union is present or not. Gradually the crutches are dispensed with, and the patients generally learn to walk very well on an elevated sole, which compensates for the shortening.

Of twelve cases of total exsection performed by the writer for tuberculosis, eleven recovered, and one died of meningeal tuberculosis. The history of the fatal case was as follows:

CASE V.—Fred. F., æt. 7 years. Osseous tuberculosis after arthroectomy performed by Dr. F. Lange, in June, 1885. On March 4, 1884, total exsection was done at the German Hospital. The operation revealed two periarticular abscesses and five cheesy foci in the tibia and femur. Suppuration of the wound occurred. On March 10 an abscess on the outer aspect of the knee was incised. On April 23 separation of the epiphysis of the tibia took place: the separated epiphysis was firmly united to the femur. Symptoms of meningeal tuberculosis developed, to which the patient succumbed May 31.

In one of the remaining eleven cases amputation of the thigh became necessary on account of suppuration. The following is a brief synopsis of this case :

CASE VI.—H. D., professional athlete, æt. 30 years. Extensive destruction of the right knee-joint by tuberculosis, complicated with pyogenic infection. The knee, leg and thigh contained a large number of abscesses; there was profuse secretion, from seven fistulæ. The case was not suitable for exsection and amputation was advised; but, at the patient's earnest request that an attempt should be made to save his limb, total exsection was done at the German Hospital, on February 14, 1884. As suppuration was expected the extremity was fixed to an interrupted dorsal suspension splint, made of hoop iron, by plaster bandages. Profuse suppuration followed, attended with evident prostration. On April 19 the thigh was amputated. The wound healed by granulation, and in June the patient was discharged cured.

Ten cases were cured in which the limb was preserved; in nine of

these firm, bony ankylosis was secured. In one there was ligamentous union, viz.:.

CASE VII.—Nicolas G., a carpenter, æt. 54 years. Synovial tuberculosis, with high temperature and emaciation, following slight traumatism. Contraction of the knee at an acute angle, with constant violent pain. On February 19, 1886, a puncture was made at the German Hospital, a small quantity of turbid, bloody serum being withdrawn. Under an anaesthetic the limb was straightened, and the joint was incised, irrigated and drained. The fever at once disappeared, but flocculent pus commenced to flow from the tube, confirming the assumption that tuberculosis was present. In view of the patient's age, and his wretched general condition, which was due partly to disease and partly to chronic alcoholism, amputation was thought to be advisable. The plan of operation was changed at the operating table, and total exsection of the knee-joint was done. Haemorrhagic synovitis, and a large cheesy deposit in the bursa of the quadriceps, were found. Five nails were introduced, and an aseptic dressing was applied, with pasteboard splints. Temporary compression with Martin's bandage was employed, in order to control the secondary oozing. The dressing was changed on the twenty-second day. Four nails were found to be loose, and were withdrawn. On May 8, the drainage tracks were scraped, and the fifth nail was removed. Ligamentous union had taken place. A plaster-of-Paris splint was applied. By June 12 the sinuses had healed, and the patient was walking without a stick or crutches, wearing a light silicate-of-soda splint, though union of the bones was not perfect.

The following are brief notes of the other nine cases:

CASE VIII. Willie B., æt. 3½ years. Osseous tuberculosis with fistulae. Total exsection was performed February 2, 1878. April 2, patient was discharged cured.

CASE IX.—Charles H. æt. 12 years. Osseous tuberculosis, with fistulae; contracture and subluxation backward. Total exsection, June 13, 1884, at German Hospital. Hahn's incision was made, made, two nails were introduced, and a plaster-of-Paris splint applied. Some fever and deep-seated œdema of the region of the knee followed. The sawn surfaces and the flesh united by first intention. The nails being withdrawn on the twelfth day, some pus exuded from their tracks, showing that they had apparently not been well disinfected. Several revisions were required on account of the development of unhealthy granulations in the drainage holes. On February 4, 1884, the patient was discharged with firm ankylosis and no fistulae.

CASE X.—S. B., æt. 9 years. Osseous tuberculosis, several fistulæ, subluxation. August 26, 1885, total exsection at Mt. Sinai Hospital. Nails were introduced and a plaster-of-Paris dressing applied. September 25 the dressing was changed, and the nails and drainage tubes were withdrawn; firm ankylosis. October 10, patient discharged cured.

CASE XI.—Leonard P., waiter, æt. 19 years. Synovial tuberculosis, no fistulæ. August 25, 1885, total exsection at the German Hospital. September 27, plaster-of-Paris splint, dressings, drainage tubes, and nails removed. October 9, sinuses healed. October 18, discharged cured with firm ankylosis.

CASE XII.—Bertha D., æt. 12 years. Synovial tuberculosis of five weeks' standing. Continuous high fever, with rapid emaciation. A puncture yielded a small amount of bloody serum. January 21, 1886, total exsection at Mt. Sinai Hospital. The capsule was found studded with innumerable miliary tubercles. The fever disappeared immediately after the operation. February 20 the plaster splint was renewed and the wound was found to have healed by first intention. March 10 the patient was discharged cured with firm ankylosis.

CASE XIII.—Lizzie B., æt. 20 years. Osseous tuberculosis of eighteen years' standing; rectangular contraction with subluxation backward. February 12, 1886, total exsection at the German Hospital. March 10, change of dressing, three nails and the drainage tube being removed; primary union. April 4, patient complained of a good deal of pain in walking. A hard body could be felt under the skin on the outer aspect of the tibia. An incision exposed the head of the fourth nail, which had not been found at the first change of dressings. It was withdrawn with some force, a little blood exuding from its track. May 9, patient discharged cured.

CASE XIV.—Anna L., æt. 22 years. Synovial tuberculosis with ulceration of the articular surfaces of both the femur and the tibia. May 10, 1886, total exsection at the German Hospital. June 12, first change of dressings. Primary union of the soft parts; delayed union of the bones. August 1, discharged cured with firm ankylosis.

CASE XV.—Synovial tuberculosis, with caseous deposits in several recesses of the capsule, notably around and behind the crucial ligaments. Caries of the articular surfaces. May 18, 1886, total exsection at the German Hospital, the operation being followed by slight fever. Dressings removed May 20, showing marginal slough of the upper edge of the skin-wound. June 17, nails removed. Firm ankylosis. July 26, patient discharged cured.

CASE XVI, Emina F., æt. 27 years. Synovial tuberculosis, with caries of the articular surfaces. April 18, 1887, total exsection. April 22, considerable amount of secondary oozing, necessitating a change of the external dressings and plaster splint. There was some fever. May 23, dressing changed; primary union, with firm ankylosis. The tubes and three nails were removed; a fourth nail could not be found. To prevent the disagreeable necessity of cutting down in search of a nail buried in the tissues, Dr. F. Lange's suggestion of fastening a silk ligature to the head of each nail before driving it in, seems to be very appropriate. June 4, an incision was made over the seat of the fourth nail, which had healed in completely and it was withdrawn.

CASE OF RECOVERY FROM STAB-WOUND OF
ABDOMEN, WITH WOUND OF COLIC AR-
TERY, AND LARGE, LONG CONTIN-
UED AND FILTH INFECTED
BOWEL-PROTRUSION.

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AT midnight of July 1, 1887, I was called to see a negro man who had been stabbed in the abdomen. Found him lying upon a dirty porch, and covered over by a filthy feather mattress, his body reeking in blood, vomit, perspiration, urine and dung, and in deep collapse. Removed mattress, found enormous protrusion of intestine, on the surface and in the folds of which were clotted blood, numerous chicken feathers from mattress, and other miscellaneous filth. The fellow's dirty hands were lying in the mass unconsciously endeavoring to support it. The intestinal tumor was cold, cyanosed and congested—this was about two hours after he had been cut. Warm water was presently got and carbolized to 5% into which some cotton underclothes (soiled) were dipped and the guts enveloped in them. After a short consultation with my colleague, Dr. J. Y. Brown, we agreed even in the face of the filthy environment and poor light (two chimneyless lamps) to proceed to the restitution of the intestines by a methodical laparotomy. The guts were irrigated with a warm 5% carbol solution, and were systematically searched through and